RELEASABLE SUTURE CLAMP AND SUTURE ANCHOR ASSEMBLY INCLUDING SAME

RELATION TO OTHER PATENT APPLICATION

This application claims priority to provisional patent application 61/595,792, filed Feb. 7, 2012, with the same title.

TECHNICAL FIELD

The present disclosure relates generally to a releasable suture clamp and a suture anchor assembly including same, and more particularly to a releasable suture clamp that includes a plurality of independent stackable components rotatable about a common axis to move the releasable suture clamp between clamped and unclamped configurations.

BACKGROUND

Sutures are commonly used in medical procedures to sew tissue together in order to close tissue openings, cuts, or incisions during or after the medical procedure. Sutures are also used, in conjunction with anchors or other similar devices, to achieve or maintain traction, or other positioning of tissues or organs, during medical procedures. According to any of these uses and others, sutures are typically looped through the tissue and the one or more free ends knotted to maintain a desired position or tension of the suture. More specifically, a clinician may manually tie together a suture pair or knot a free end of a single suture to secure the appropriate positioning. According to embodiments where the suture is used to maintain traction, tension in the suture between the anchor and the knot tied adjacent the patient's skin ultimately provides the desired traction.

Although knotting sutures may prove effective for certain procedures, there are a number of disadvantages of knotting sutures to secure tissues to one another and/or maintain a desired tension. For example, knot tying may require a considerable amount of time and may require a certain degree of dexterity. Further, knots may permanently fix a suture in place and, thus, may not be removed or adjusted once in place without removing the entire suture. Thus, although an additional knot may be created to increase suture tension, decreasing suture tension may require abandoning the previous suture and using another suture that may be knotted at the appropriate tension.

U.S. Pat. No. 7,806,910 to Anderson teaches a suture clip comprising a plurality of flexible elements positioned together in a row. Specifically, first ends of the elements, which are bonded together at second ends thereof, are movable about living hinges and configured such that a tool may be used to urge the first ends of at least a portion of the flexible elements inward to define a slot between the first ends of the elements. A suture may be received within the slot, while the tool is actuating the flexible elements, and may later be held by the clip when the flexible elements are moved apart such that a tortuous path through the first ends of the elements is defined. The suture clip taught by Anderson, which appears to require a tool for actuation, is particularly suited for internal suturing, as described in the disclosure.

The present disclosure is directed toward one or more of the problems or issues set forth above.

SUMMARY OF THE DISCLOSURE

In one aspect, a suture anchor assembly includes a length of suture having an anchor attached to an end thereof. A releasable suture clamp is disposed in a clamped configuration about the suture. The releasable suture clamp includes a plurality of independent stackable components rotatable about a common axis, which is transverse to opposing faces of the stackable components. Each of the stackable components has a first opening passing through the opposing faces, spaced from the common axis, and sized for receiving the suture therethrough. The releasable suture clamp has an unclamped configuration in which the first openings are aligned relative to an alignment axis and the clamped configuration in which the first openings are misaligned relative to the alignment axis, wherein the alignment axis is parallel to the common axis.

In another aspect, a releasable suture clamp includes a plurality of independent stackable components rotatable about a common axis, which is transverse to opposing faces of the stackable components. Each of the stackable components has a first opening passing through the opposing faces, spaced from the common axis, and sized for receiving a suture therethrough. The releasable suture clamp has an unclamped configuration in which the first openings are aligned relative to an alignment axis, which is parallel to the common axis, and a clamped configuration in which the first openings are misaligned relative to the alignment axis.

In another aspect, a method of clamping a suture with a releasable suture clamp includes a step of moving the releasable suture clamp from a clamped configuration to an unclamped configuration by rotating a plurality of independent stackable components of the releasable suture clamp about a common axis such that first openings are aligned relative to an alignment axis and define a linear path. The suture is received through the first openings along the linear path. The releasable suture clamp is then returned from the unclamped configuration to the clamped configuration by rotating the stackable components about the common axis such that the first openings are misaligned relative to the alignment axis and define a serpentine path. Movement of the suture relative to the suture clamp is restricted by gripping the suture with edges defining the first openings and surfaces of the stackable components defining the serpentine path.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a releasable suture clamp, shown in a clamped configuration, according to one embodiment of the present disclosure;

FIG. **2** is a perspective view of one of a plurality of independent stackable components of the releasable suture clamp of FIG. **1**;

FIG. **3** is an exploded view of the releasable suture clamp of FIG. **1**, shown in the clamped configuration;

FIG. **4** is a perspective view of the releasable suture clamp of FIG. **1**, shown in an unclamped configuration;

FIG. **5** is an exploded view of the releasable suture clamp of FIG. **4**, shown in the unclamped configuration;

FIG. **6** is a plan view of a sterilized package containing a plurality of suture anchor assemblies including releasable suture clamps, according to another aspect of the present disclosure;

FIG. **7** is a side sectioned view of a suture anchor assembly of FIG. **6**, shown with a blunt end holder removed;

FIG. **8** is a side diagrammatic view of an abdomen wall and stomach of a patient at one stage of a percutaneous gastrostomy procedure, which illustrates an exemplary use of the suture anchor assembly of FIG. **7**;